

Conestoga Television Association

Lancaster, Pennsylvania

Technical Report

600 MEGACYCLE TRANSMITTING EQUIPMENT

WELSH MOUNTAIN STATION W3XBR

(In use January 1947)

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Prints E-6, E-5, E-8, E-7, 96.11A-753, 96.11A-749, C-1, D-1, D-3, D-4

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General

The equipment was set up to test the overall system of relay. While it was of the "breadboard" type the results were indicative of the trends needed for developing a reliable station. The units comprising the transmitter were not all suitable for rack mounting and accordingly they were arranged near the two racks which were in place at the station. The units used were: 600 mc oscillator; 600 mc power amplifier; modulator; transmitter power supply; video amplifier power supply; and modulation power supply.

600 mc Oscillator

The type 5588 tube was operated in the circuit shown in print E-8. With the plate tuned to quarter wave resonance and the cathode tuned to three quarter wave resonance the feedback stub can be set to produce oscillation. By setting the stub on the output line to both the correct location and length optimum output is obtained. About five feet of 75 ohm flexible coaxial cable fed this power to the power amplifier.

600 mc Power Amplifier

Push-pull type 5588's are connected in a grounded grid circuit as shown on print E-8. The plates are tuned to three quarter wave resonance and cathodes are also tuned to three quarter wave resonance. The ground plate supporting the tubes at the grid flanges separates the tubing which shields the anode lines from the tubing which shields the cathode lines. Power is taken out by means of a loop coupled to the plate lines.

Cathode modulation is used. The method of connection is shown in print E-5.

Modulator

The schematic diagram on print E-8 shows the video amplifier and modulator stages. Signal is brought in over 75 ohm coaxial cable at the level of about 1 volt. Three video stages provide sufficient gain and appropriate gain to provide modulating signal across the 100 ohm resistor shown in the 5588 cathode circuit on print E-5. The type 6AS7G tube was selected because it is well fitted to provide high current swing in the low cathode resistor required for video band pass.

A low plate voltage is required by the 6AS7G and so to insure keeping within dissipation ratings it was necessary to construct a special supply E-7.

The DC level is maintained by the 6B6 diode connected in the grid circuit of the modulator tubes. Two controls are used. The DC level is used to establish correct relation of black to white carrier levels and the gain control at the input to the video amplifier is used to establish the correct utilization of the available carrier.

Monitor

For these tests a monitor of the diode rectifier type was set up to couple signal from the lead in as it left the transmitter house. A lighthouse diode type tube had its cathode heated with a separate transformer. Signal was fed into the grid-cathode cavity and a coax cable connected to bring the rectified signal to a type TMU122B oscilloscope. Signal level was limited so the amplifier in the scope was used. Crowding of either sync or whites could be seen on the scope so that was used as a measure of over modulation.

By telephone communication with receivers in Lancaster, the results of crowding whites was ascertained. No setting of the controls could be seen to effect linearity of sync signal.

Transmitter Power Supply

This supply is of the series regulated type as shown on print 92.11A-753. The output voltage may be controlled near the rated 425 volt level. Output ripple is less than 0.1 volt at full load.

Modulator Power Supply

Alterations were made in the regulated supply as shown on print 92.11A-753 to make a 150 volt supply as shown on print No. E-7.

Video Amplifier Power Supplies

The schematic of our supply is shown on print C-1. VR tubes are used to regulate both the 300 volt output and the negative taps. Negative voltage is obtained from a 6X5GT type tube connected as a half wave rectifier. The 300 volt supply was used for the screen of the last video amplifier stage (6AG7). The -225 volt supply was used to supply bias to the DC restorer.

The circuit of the other 300 volt supply is shown on print 92.11A-749. This was used for the plates of all video amplifier stages.

Antenna

Sketches of the antenna are shown on prints D-1, D-3 and D-4. Lead-in material was 300 ohm twin lead. It was taken in convenient lengths and joined as shown on D-4 to tie all antennae to the common lead-in which was of the same material. The antenna was mounted with elements vertical. The center of the array was about 57 feet from the ground. The array "faced" Lancaster. Since the tower is about 15 feet from the transmitter house and 8 feet inside the house the lead-in was about 80 feet long.

Operation

After initial adjustments were made the routine operation was relatively simple. Frequency was adjustable by means of the oscillator plate cavity. The Lavoie meter was used for this check.

Steps in setting up the Station were:

1. Connect antenna.
2. Adjust 5588 filament controls to zero.
3. Apply voltage to all heater circuits and increase 5588 heaters to rated 2.5A each.
4. Apply plate voltage to the oscillator. Check frequency.
5. Apply plate voltage to power amplifier modulator and video amplifier. Read voltage and current to power amplifier.
6. Set receiver to a good picture.
7. Check scope and set video gain and DC restorer to just not chip whites. Recheck current to P.A.
8. After any changes in picture setting recheck transmitter.